We claim:

1. A process for preparing an aqueous dispersion of particles composed of addition polymer and finely divided inorganic solid (composite particles), in which process a mixture of ethylenically unsaturated monomers is dispersely distributed in aqueous medium and is polymerized by the method of free-radical aqueous emulsion polymerization by means of at least one free-radical polymerization initiator in the presence of at least one dispersely distributed, finely divided inorganic solid and at least one dispersant, wherein

   a) a stable aqueous dispersion of said at least one inorganic solid is used, said dispersion having the characteristic features that at an initial solids concentration of ≥ 1% by weight, based on the aqueous dispersion of said at least one solid, it still contains in dispersed form one hour after its preparation more than 90% by weight of the originally dispersed solid and its dispersed solid particles have a weight-average diameter ≤ 100 nm,

   b) the dispersed particles of said at least one inorganic solid exhibit a nonzero electrophoretic mobility in an aqueous standard potassium chloride solution at a pH which corresponds to the pH of the aqueous reaction medium at the beginning of the emulsion polymerization,

   and

   c) the mixture of ethylenically unsaturated monomers contains > 0 and ≤ 4% by weight, based on its overall amount, of at least one ethylenically unsaturated monomer A, which comprises either

      - at least one acid group and/or its corresponding anion, if the dispersed particles of said at least one inorganic solid have an electrophoretic mobility with a positive sign under the abovementioned conditions,

      or

      - at least one amino, amido, ureido or N-heterocyclic group and/or its ammonium derivatives alkylated or protonated on the nitrogen, if the dispersed

particles of said at least one inorganic solid have an electrophoretic mobility with a negative sign under the abovementioned conditions.

2. A process as claimed in claim 1, wherein said at least one inorganic solid is selected from the group consisting of silicon dioxide, aluminum oxide, tin(IV) oxide, yttrium(III) oxide, cerium(IV) oxide, hydroxyaluminum oxide, calcium carbonate, magnesium carbonate, calcium orthophosphate, magnesium orthophosphate, calcium metaphosphate, magnesium metaphosphate, calcium pyrophosphate, magnesium pyrophosphate, iron(II) oxide, iron(III) oxide, iron(II/III) oxide, titanium dioxide, hydroxyapatite, zinc oxide, and zinc sulfide.

3. A process as claimed in either of claims 1 and 2, wherein said at least one inorganic solid in water at 20°C and 1 bar (absolute) has a solubility ≤ 1 g/l water.

4. A process as claimed in any of claims 1 to 3, wherein said at least one dispersant is an emulsifier.

5. A process as claimed in any of claims 1 to 4, wherein said at least one monomer A comprises at least one acid group and/or its corresponding anion which is selected from the group consisting of the carboxylic acid, sulfonic acid, sulfuric acid, phosphoric acid and phosphonic acid groups.

6. A process as claimed in any of claims 1 to 5, wherein said at least one monomer A is selected from the group consisting of acrylic acid, methacrylic acid, maleic acid, fumaric acid, itaconic acid, crotonic acid, 4-styrenesulfonic acid, 2-methacryloxyethylsulfonic acid, vinylsulfonic acid and vinylphosphonic acid.

7. A process as claimed in any of claims 1 to 4, wherein said at least one monomer A is selected from the group consisting of 2-vinylpyridine, 4-vinylpyridine, 2-vinylimidazole, 2-(N,N-dimethylamino)ethyl acrylate, 2-(N,N-dimethylamino)ethyl methacrylate, 2-(N,N-diethylamino)ethyl acrylate, 2-(N,N-diethylamino)ethyl methacrylate, 2-(N-tert-butylamino)ethyl methacrylate, N-(3-N',N'-dimethylaminopropyl)methacrylamide and 2-(1-imidazolin-2-onyl)ethyl methacrylate and also 2-(N,N,N-trimethylammonium)ethyl acrylate chloride, 2-(N,N,N-trimethylammonium)ethyl methacrylate chloride,

2-(N-benzyl-N,N-dimethylammonium)ethyl acrylate chloride and 2-(N-benzyl-N,N-dimethylammonium)ethyl methacrylate chloride.

8. A process as claimed in any of claims 1 to 6, wherein said at least one free-radical polymerization initiator is 2,2'-azobis(amidinopropyl) dihydrochloride.

9. A process as claimed in claim 7, wherein said at least one free-radical polymerization initiator is selected from the group consisting of sodium peroxodisulfate, potassium peroxodisulfate, ammonium peroxodisulfate.

10. An aqueous dispersion of composite particles obtainable by a process as claimed in any of claims 1 to 9.

11. An aqueous dispersion as claimed in claim 10, wherein ≥ 50% by weight of the finely divided solid particles, based on the overall amount of finely divided solid particles present in the composite particles, are bound on the surface of the polymer matrix.

12. The use of an aqueous dispersion of composite particles, as claimed in claim 10 or 11, as an adhesive, as a binder, for producing a protective coat, for modifying cement formulations and mortar formulations, or in medical diagnostics.

13. A composite-particle powder obtainable by drying an aqueous dispersion of composite particles, as claimed in claim 10 or 11.